



PHOTOGRAPHING THE MILKY WAY

By Judy Robichaux

TIPS TO GET YOU STARTED

The majority of my photography has been horse related; I do not have a background in astronomy. Photographing night skies is a new experience.



The Beginning

When Comet Neowise appeared in the summer of 2020, I was prepared to delve into astrophotography! Armed with my 70-200 lens (since it most looked like a telescope), I fumbled around with settings and actually was THRILLED to get these images. Noise was reduced in Lightroom, but so were many stars.

If and when another comet comes, I'll NOT use these settings again and will leave the telephoto lens at home:

focal lengths from 70-110m
shutter speed of 10 seconds



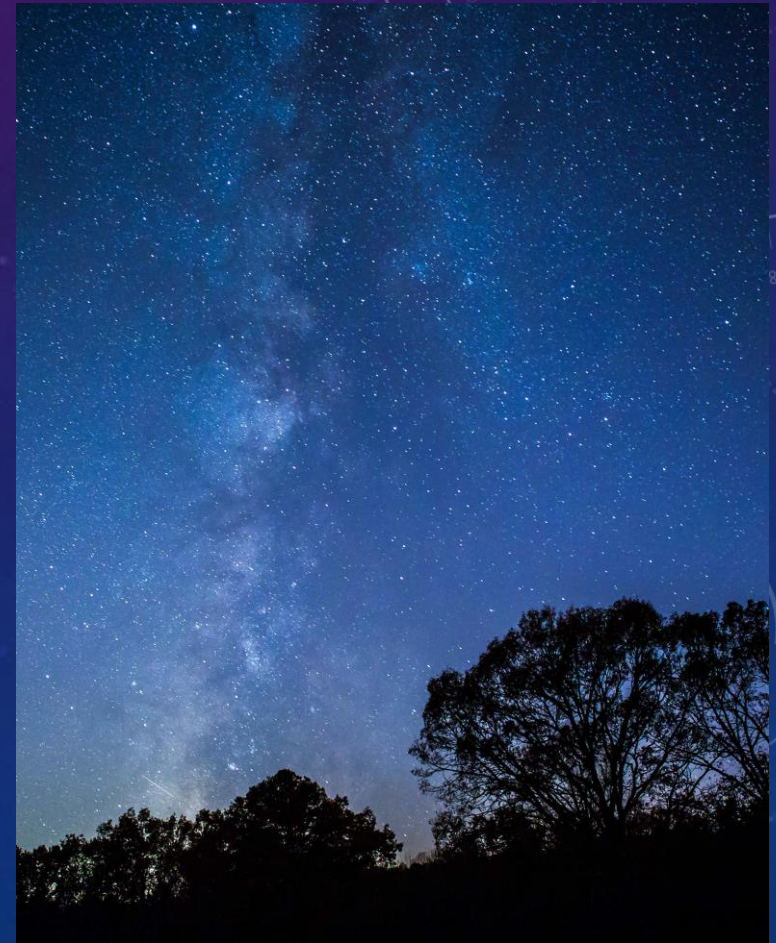
Taken with 70-200 2.8 L & Canon 5DIII



Same camera with 24-70 2.8 L Lens



In November 2020, the camera club went on an outing and this was my very first Milky Way photo. Chuck suggested the following settings, and I was elated with the results: 24mm, f/2.8, ISO 3200 and shutter speed of 25 seconds using a shutter release cable or timer delay. His formula worked and I was hooked on shooting the night sky!



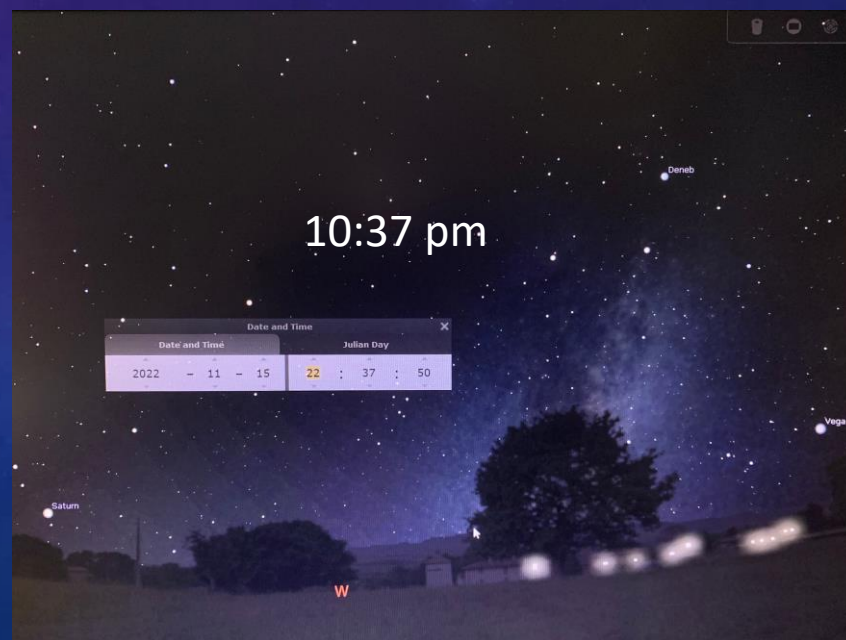
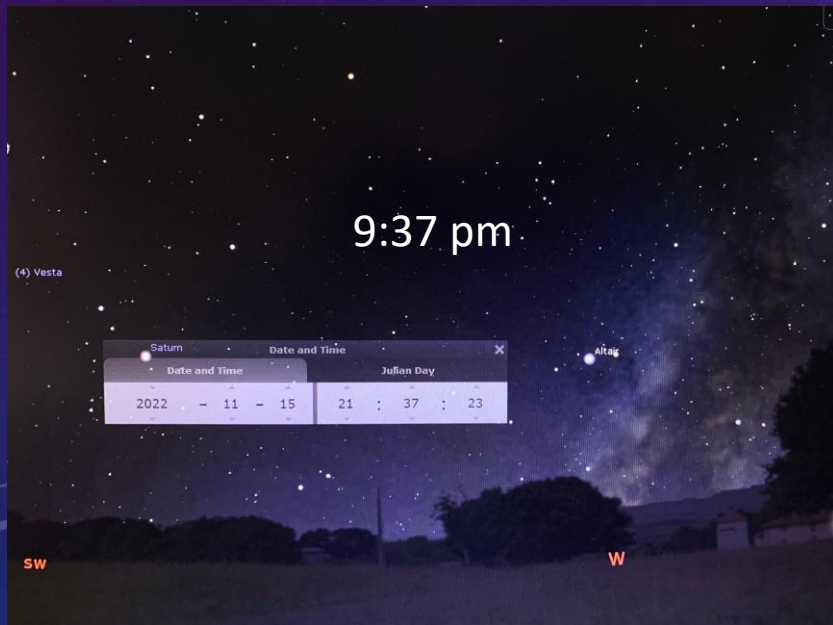
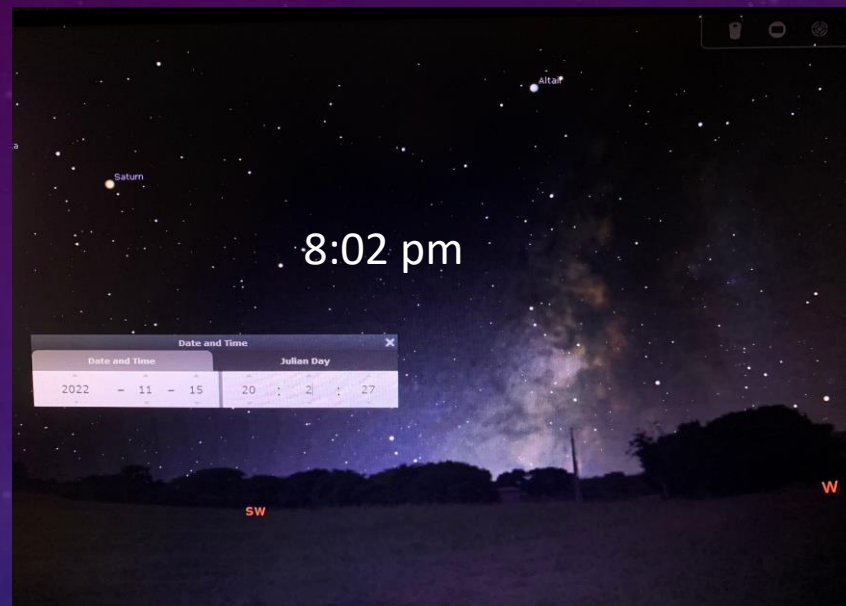
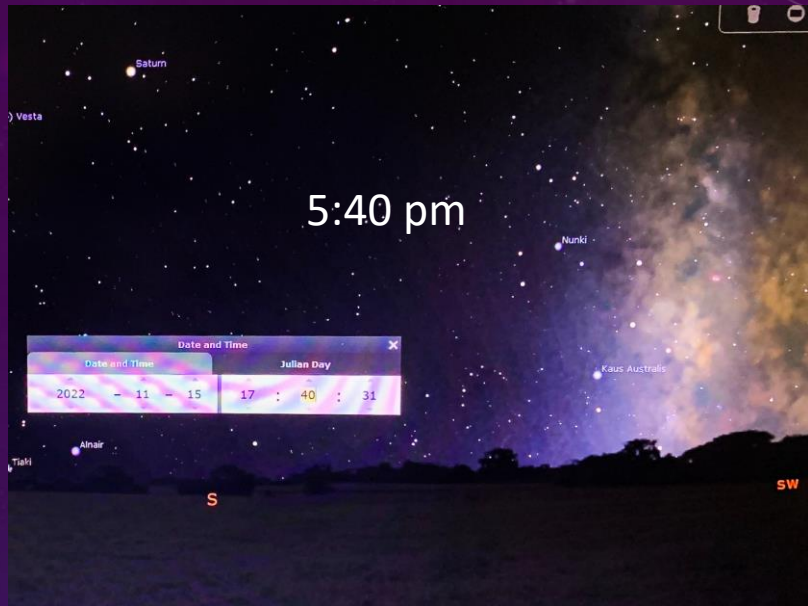
I started researching Milky Way photography that winter and came across [Kristine Rose Photography](#). I liked her work, and she offered free classes through her Facebook page, which I attended multiple times. Maybe she could show me how to make my images look better. Boy, did she ever have lots of suggestions! The following are some of the most important:

I thought the best time to view the Milky Way would be anytime on a cold, clear winter night, but I found out that the core is only visible during “Milky Way Season”. Around here, that is from late February until early December. Also, the Milky Way is constantly moving throughout the night and the season.

I use the Stellarium app for planning where and when the Milky Way is visible. Ideally, you want to shoot during the new moon, but as long as moonrise is more than an hour away, or the moon has set for at least an hour, the sky should be dark enough. Generally, look south.

I have heard that Stellarium mobile app is not as good, so I use Stellarium on a laptop or desktop.

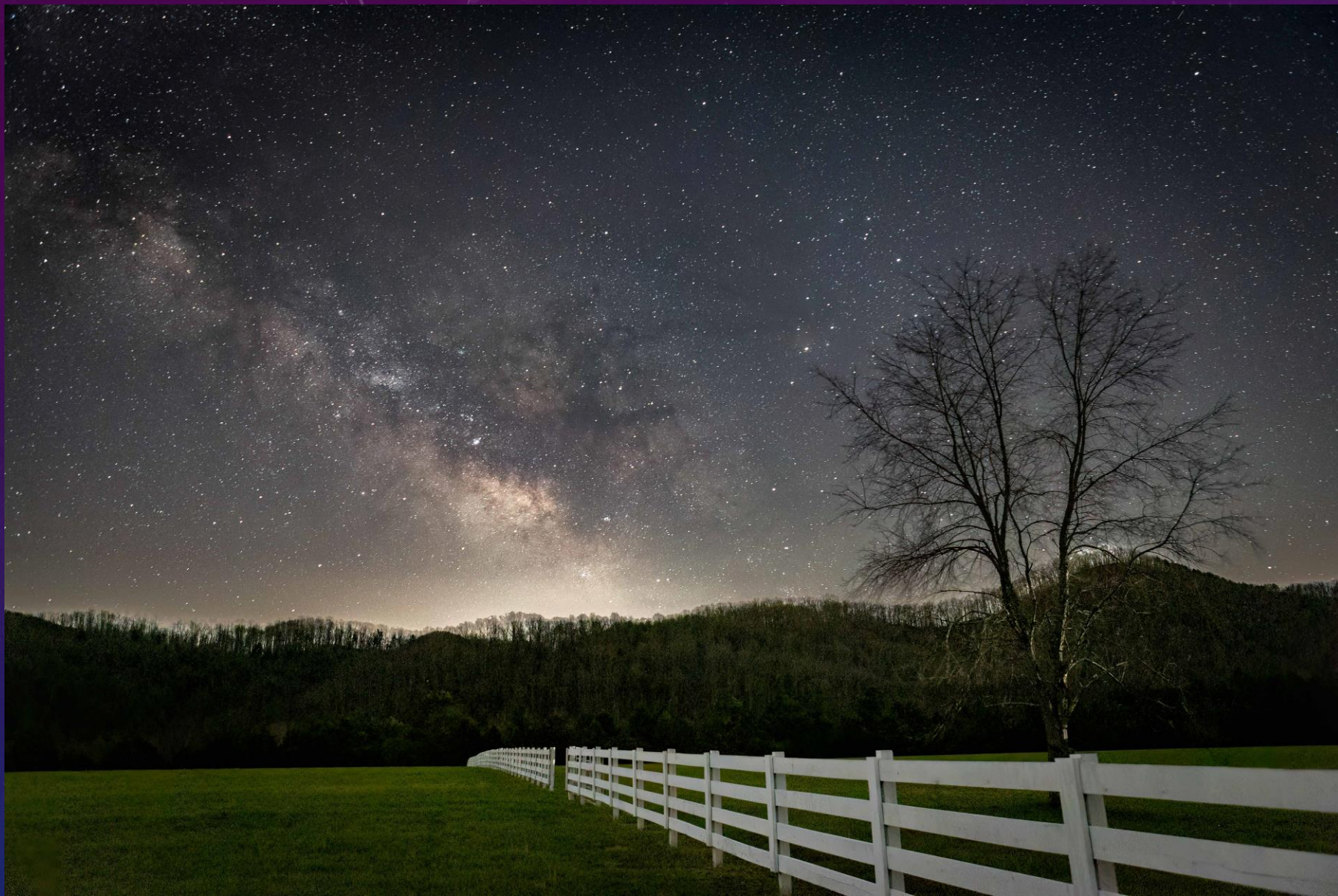
The next slides show the changing positions of the Milky Way during a November night.



As the earth revolves around the sun our view of the Milky Way core changes; early in the season the Milky Way will be more horizontal and is seen rising before dawn in the southeast sky.



25 sec, 14mm, 3200



March 21, 5:34 AM, 24mm, 2.8, 15 seconds, ISO 3200

As the season progresses the Milky Way will be diagonal in the sky as it moves toward the south.



25 sec, 14mm, 3200



As the season progresses, the Milky Way appears more vertical.

June 1, 4:32 AM

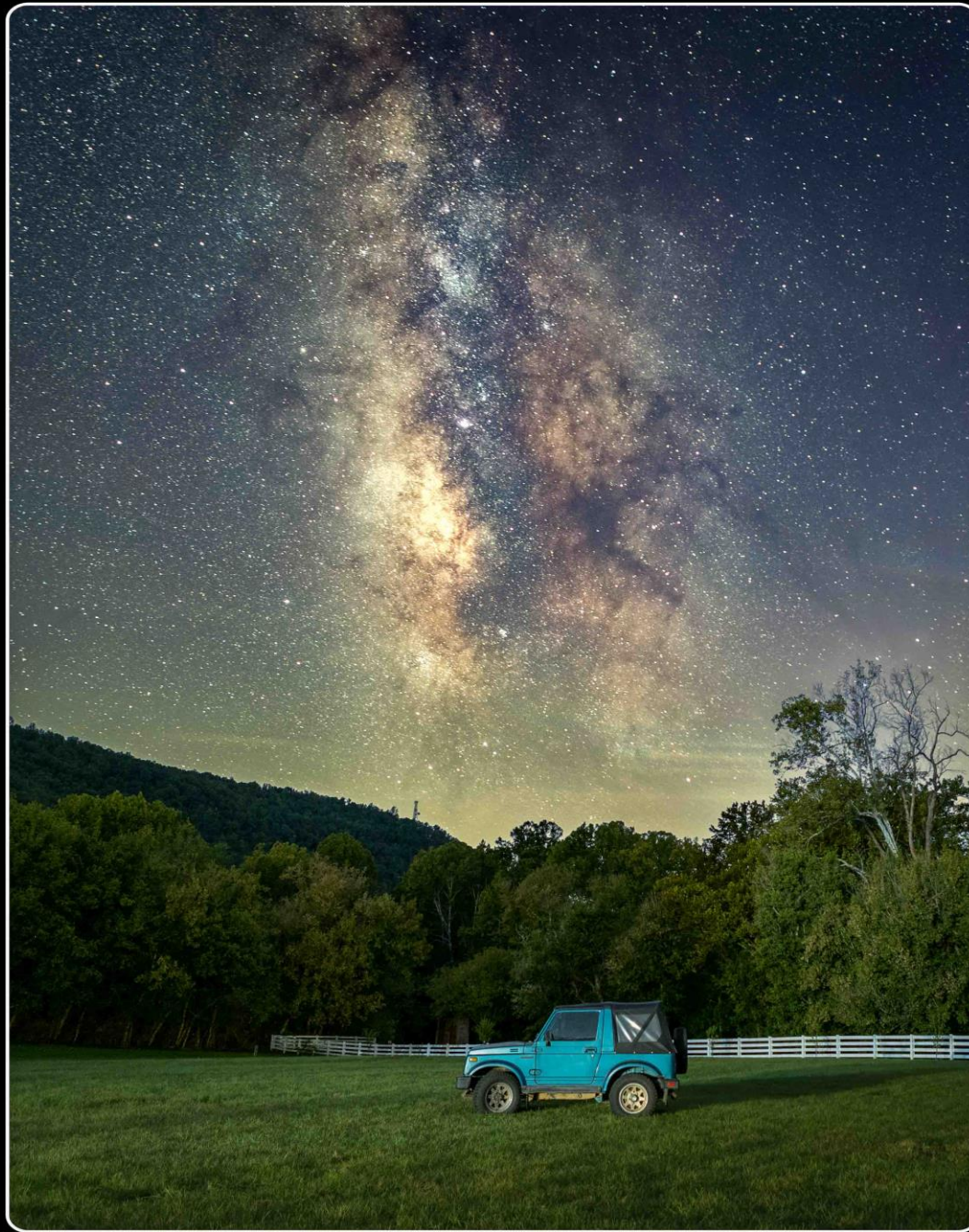
24 mm

f/1.4

25 seconds

ISO 1600

Near the end of the season the Milky Way will be completely vertical or even tipping toward the west before it sets below the horizon in the early evening.



September 23, 8:32 PM

24 MM

20 seconds

f/2.8

ISO 6400

We like to scout out locations during daylight and use the compass on my phone to figure out where to look for the Milky Way. We're looking for a safe, interesting spot that would make a good landscape photo. Sometimes a place has too many security lights to work, so we usually have backup sites in mind. We need to be facing away from bright lights from cities and get permission from landowners to go on their properties at night.

Three Major Factors Determining Whether We Even Leave the House to Shoot:

Clear skies with no or slight breeze

Moon's location (below horizon for at least 1 hour)

Where and when the Milky Way will be visible;
generally look south



Even a small amount of clouds and the neighbor's lights will affect your Milky Way pictures.

Smoke from the Canadian wildfires obscured the Milky Way many nights, but I captured lightning bugs and a few stars.

July 16, 9:53 PM

24 mm

f/1.4

20 seconds

ISO 1600



I knew the Milky Way wasn't going to be in this photo, but wanted to see if I could capture the mountains beyond Lake Powell.

Single shot
September 21, 9:34 PM

24 mm
f/ 1.4
20 seconds
ISO 1600



If the Milky Way is visible and the weather and moon are favorable, we'll plan on going out! I like to pre-select all my camera settings while still in the house (this saves time fumbling in the dark). So what should those settings be? And how can you possibly focus in the dark?

IDEAL SETTINGS:

30 seconds shutter speed, F/2.8, ISO 3200

However, shutter speed and aperture depend on your lens.

The website, lonelyspeck.com, contains a calculator that will give you an estimate of what your shutter speed should be. Try its settings and if your stars "trail", lower the shutter speed until they look more like dots.

SHUTTER SPEED: 500 Rule

How short of a shutter speed do we need to eliminate trailing in the stars?

There are several factors that contribute to this, the biggest one is what your focal length is. The longer the focal length, the greater the magnification of the stars in your image and the more noticeable star trailing is.

The best and simplest place to start is using the 500 Rule. The rule is to divide 500 by your crop factor*focal length.

If you use a shutter speed longer than the 500 rule states, your stars will become streaks due to the earth's movement.

Focal Length

Full Frame

14mm 35 seconds
16mm 31 seconds
18mm 27 seconds
20mm 25 seconds
24mm 20 seconds
35mm 14 seconds
50mm 10 seconds
70mm 7 seconds

APS-C Crop (1.5 or 1.6x)

23 seconds
20 seconds
18 seconds
16 seconds
13 seconds
9 seconds
6 seconds
4 seconds

With my 24mm lens I should be able to shoot for 20 seconds before stars start to trail (generally; check with a test shot). Before heading outside in the dark to shoot, I set my lens to manual focus set to infinity, then backed off a tad and turn off image stabilization, camera to manual, shutter speed 20 seconds, f/2.8 and since my shutter speed is less than the ideal 30 seconds, I'll up my ISO to 6400 to compensate for having less light. I'll set white balance to tungsten, which gives less of a blue hue than we get with auto white balance. I also shoot RAW instead of jpeg.

Ready to head outside!

It's always colder than you'd expect, dress warmly. I also wear boots during rare warm nights in case I step on some hidden critters (snakes come to mind).

Tripod

Camera and wide angle lens with settings pre adjusted to get started.

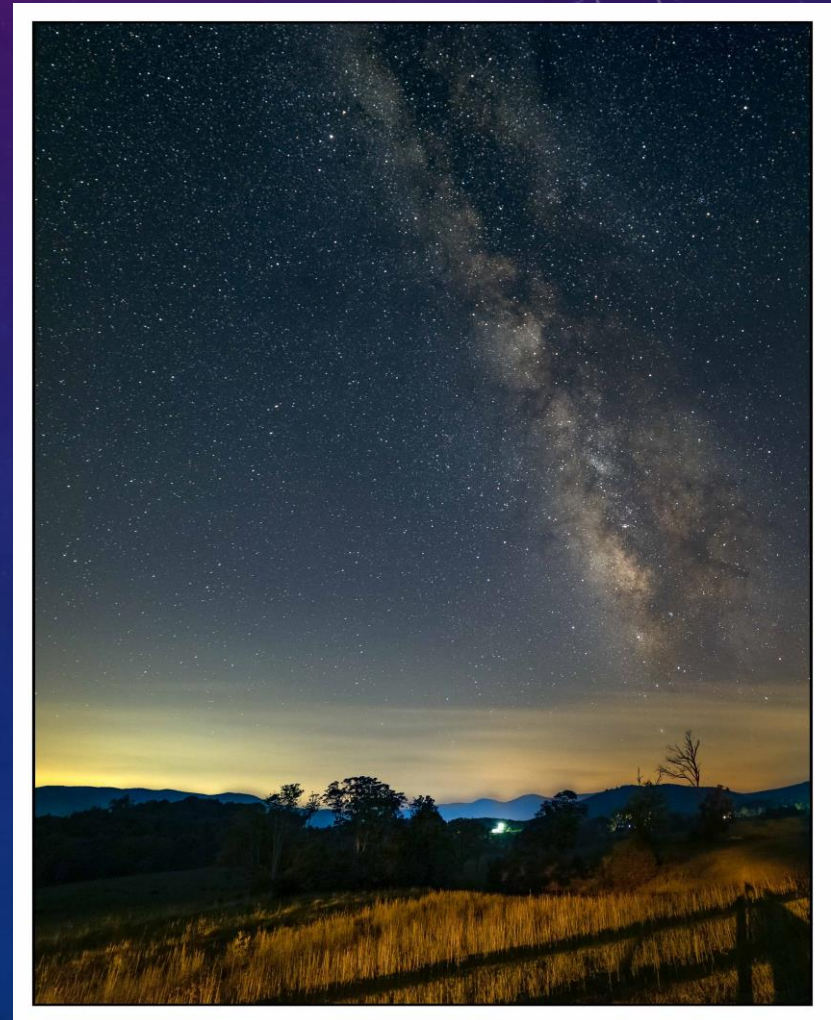
Shutter release cable or know how to use 2 second delay on the camera to prevent shake.

Flashlight or headlamp. I like the red headlamp which frees up my hands and doesn't attract insects or ruin my night vision.

I'll set up the tripod and camera securely and wait for the Milky Way to appear. I'll focus to infinity, then back off just a tad bit as Jon Beard suggested, then focus on one bright star using live view. (Hopefully, I'll remember to turn off my headlamp!) My test shots will show the Milky Way much better than we can see with our eyes, and I might reposition the camera. I'll also look for star trails, which means my shutter speed needs to be reduced. If test shots are too dark, I'll increase the ISO. If I plan to "stack" photos on the computer later, I'll take 10-15 shots from the exact same location with the exact same settings.

We live in an area with LOTS of planes flying overhead. During a 20 second exposure, I'm likely to get multiple light streaks from them. To counter this, I take 10-15 exposures that are EXACTLY the same, then STACK them in a program called **Sequator** (Mac users have **Starry Landscape Stacker**). These programs line up the stars, freeze the ground and produce ONE image that has little noise and no streaks because these programs look for differences in the 15 images and eliminate them!

20 sec, 14mm, 3200





Sequator

Sequator is a free software which can track stars on multiple images, align stars and stack them.

If you don't have an equatorial mount, by stacking non-blur star images in short-time exposures, the result will be almost similar to long-exposure on an equatorial mount. However, Sequator can control the exposure properly by auto-brightness or HDR-mode output, in 16-bit TIFF for further post processing. Additionally average random noises, rather than over-exposed on a physical equatorial mount.

- Easy; user friendly
- Fast
- Automatic determination for best parameters
- Capable under heavy light pollution
- Powerful correction for wide-angle & complex distortions
- Intelligent sky mask
- Foreground detection & stacking
- Star light enhancement function
- Light pollution reduction function
- Support star trails mode
- Batch processing for time-lapse
- Support RAW & 16-bit TIFF

Sequator will not provide too many confusing options; in contrast, strictly select the most effective features for you. Endeavor to automatically determine best parameters, save the time from boring trials. "Simple but powerful", is the core philosophy of Sequator.

- Star images
 - 22GV0533.tif
 - 22GV0534.tif
 - 22GV0535.tif
 - 22GV0536.tif
 - 22GV0537.tif
 - 22GV0538.tif
 - 22GV0539.tif
 - 22GV0540.tif
 - 22GV0541.tif
 - 22GV0542.tif
 - 22GV0543.tif
 - 22GV0544.tif
- Base image (22GV0538.tif)
- Noise images
- Vignetting images
- Output

Options

Unify exposure

- Composition: Align stars
 - Accumulation
 - Sky region: Full area
 - Auto brightness: Off
 - High dynamic range: Off
 - Remove dynamic noises: Off
 - Reduce distort. effects: Off
 - Reduce light pollution: Off
 - Enhance star light: Off
 - Merge 4 pixels: Off
 - Time-lapse: Off
 - Color space: sRGB

Start

Base image preview:



Image files of star shots. Raw files are recommended

- Star images
 - 22GV0533.tif
 - 22GV0534.tif
 - 22GV0535.tif
 - 22GV0536.tif
 - 22GV0537.tif
 - 22GV0538.tif
 - 22GV0539.tif
 - 22GV0540.tif
 - 22GV0541.tif
 - 22GV0542.tif
 - 22GV0543.tif
 - 22GV0544.tif
- Base image
 - (22GV0538.tif)
- Noise images
- Vignetting images
- Output

Base image preview:



- ☑ Composition: Align stars
 - Accumulation
- Sky region: Partial
- Auto brightness: Off
- High dynamic range: Off
- Remove dynamic noises: Off
- Reduce distort. effects: Off
- Reduce light pollution: Off
- Enhance star light: Off
- Merge 4 pixels: Off
- Time-lapse: Off
- Color space: sRGB

- Sky region
 - Boundary line
 - Gradient
 - Irregular mask [Reset](#)
 - Auxiliary highlight

Fill the sky with brush
▶ Start

If there is foreground, specify correct sky region will help detection and processes more accurate

Sequator takes my 15 images and produces one which has little noise and no streaks from jets, satellites or shooting stars. Then I'll play with that some more in Lightroom.

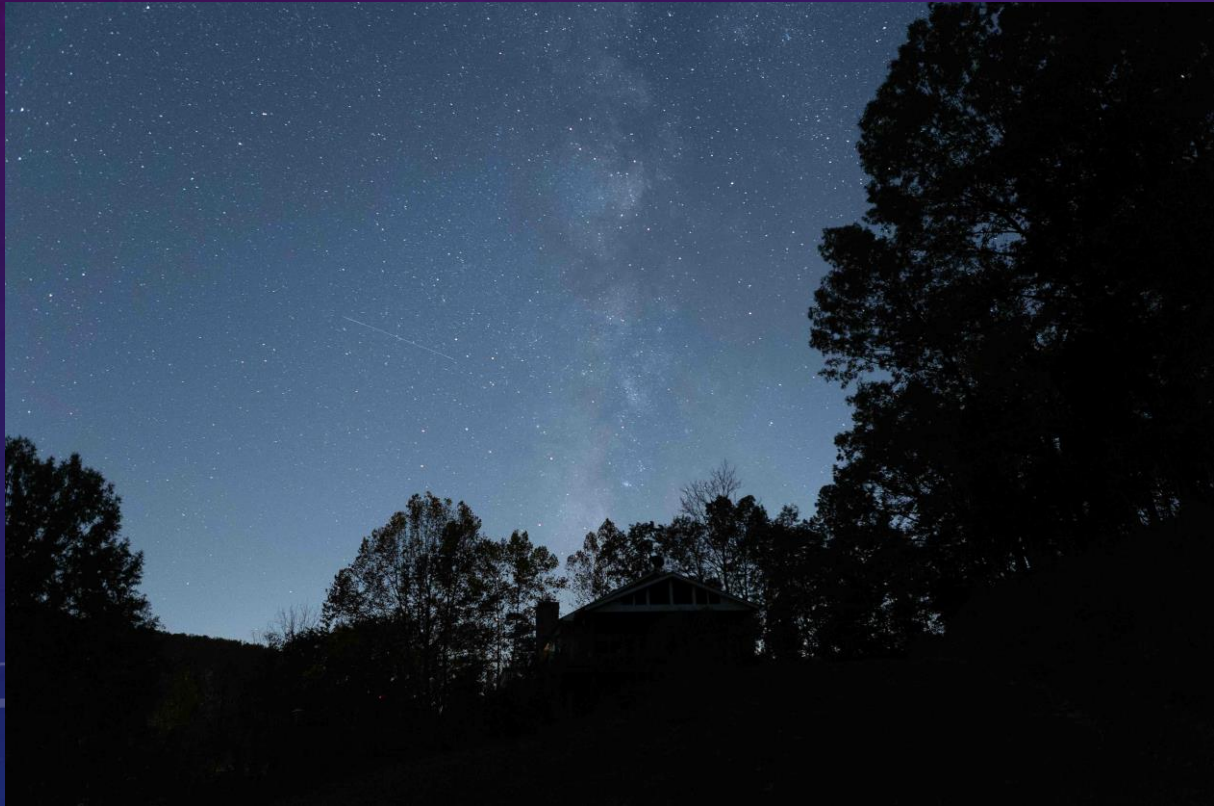


The main adjustments will include exposure, contrast, highlights, shadows, blacks and temperature. Lightroom makes it easy to adjust the sky separately from the foreground and selectively mask just the Milky Way. I just play with photos until satisfied with the results.

Straight out of the camera:

20 sec, 24mm, 6400

After experimenting with adjustments:



Terms describing types of Milky Way photographs:

SINGLE SHOT (Start here, getting one good image.)

STACKED (Run 10-15 identical photos through Sequator or Starry Landscape Stacker to produce one image with reduced noise and a cleaner sky without jet or satellite trails.)

TRACKED (Use a star tracker such as Move Shoot Move Rotator to increase shutter length; however, foreground will be blurry so you will also have to take a separate shot for it and blend the two in Photoshop.)

BLENDED (Take one long exposure photo at lower ISO of the foreground and a separate photo of the sky without moving the tripod and put them together in Photoshop, masking out the blurry sky that results from the long exposure of the foreground.)

PANORAMA (Take 1-3 rows of vertical photos, then stitch together in Lightroom, Photoshop or other programs.)

COMPOSITE (Two photos from different locations blended into one)



Single Shot

September 19
9:39 PM

24 mm
f/1.4
20 seconds
ISO 1600

Example of a Blend

Top left: expose for foreground, 390 seconds, ISO 800, 24mm

Bottom left: expose for sky, 20 seconds, ISO 6400, stack of 15 images

Below: Blend of foreground and sky images done through Photoshop





Example of a Blend

**April 18
4:02 AM**

**14 mm
f/2.8**

**Sky
30 seconds
ISO 3200**

**Foreground
390 seconds
ISO 1600**

**Two separate images
blended together in
Photoshop**



My first attempt at a panorama, realizing I should have taken another row of shots for the ground. My goal was to capture the arch from side to side.

April 18, 3:13 AM

Series of vertical shots taken at 14 mm, f/2.8, 30 seconds, ISO 3200 and stitched together in Lightroom

The following slides show in more detail the adjustments I made to a photo, from start to finish. This would be classified as stacked and blended. That's generally the way to reduce noise and lighten the foreground.

Straight out of the camera with auto white balance giving bluish cast. Jet trail on the left.

The screenshot displays the Adobe Lightroom Classic interface. The main window shows a photograph of a night sky with a prominent jet trail on the left side. The interface includes a top menu bar with options like File, Edit, Develop, Photo, Settings, Tools, View, Window, and Help. Below the menu is a toolbar with icons for various functions. The central area is the main image, which is currently in the 'Develop' module. To the left of the main image is the 'Navigator' panel, showing a smaller version of the photo and a list of collections. To the right is the 'Histogram' panel, displaying a color histogram with a peak in the blue range. Below the histogram is the 'Basic' panel, which contains sliders for white balance (Temp: 3150, Tint: +4), exposure, contrast, highlights, shadows, whites, blacks, texture, clarity, dehaze, vibrance, and saturation. The bottom of the interface shows a grid of photo thumbnails, with the selected photo highlighted. The Windows taskbar is visible at the very bottom, showing the search bar, taskbar icons, and system tray.

Sky color neutralized; exposure, contrast & shadows increased; highlights and blacks decreased.

The screenshot displays the Adobe Lightroom Classic interface. The main workspace shows a night sky photograph of the Milky Way. The interface includes several panels and controls:

- Navigator:** Shows a smaller version of the photo and a zoom level of 100%.
- Presets:** A 'None' preset is selected with an amount of 100.
- History:** Lists recent actions such as 'Export - Hard Drive' and 'Import'.
- Collections:** A tree view showing folders like '2022', 'Baby Shower Gavin', and 'Texas Trip'.
- Basic Panel:** Shows adjustments for the photo:
 - Treatment: Color
 - Profile: Adobe Color
 - WB: Custom, 4456
 - Temp: -3
 - Tone: Auto
 - Exposure: +1.49
 - Contrast: +77
 - Highlights: -56
 - Shadows: +51
 - Whites: 0
 - Blacks: -60
 - Presence: Texture 0, Clarity 0, Dehaze +12, Vibrance 0, Saturation 0
- Tone Curve:** A panel for adjusting the photo's tonal range.
- Grid:** A filmstrip of 58 photos, with photo 45 selected.

The Windows taskbar at the bottom shows the system time as 10:09 AM on 11/11/2022.

Separate, long exposure shot makes foreground visible. Ignore overexposed, blurry sky; I'll mask it out in Photoshop.

The screenshot displays the Adobe Lightroom Classic interface. The main window shows a long-exposure photograph of a lake surrounded by a dense forest. The sky is filled with light trails from stars, indicating a long exposure. The interface includes a Navigator panel on the left, a History panel, and a Develop panel on the right. The Develop panel shows various adjustment sliders for Basic, Tone, and Presence. The top of the window displays the title bar and menu options. The bottom of the window shows the Windows taskbar with various application icons and the system tray.

Lightroom Parent Folder Start 2021-v12 - Adobe Photoshop Lightroom Classic - Develop

File Edit Develop Photo Settings Tools View Window Help

Adobe Lightroom Classic
Judy Robichaux

Library | Develop | Map | Book | Slideshow | Print | Web |

Navigator FIT 100% 66.7%

Preset: None
Amount: 100

Heavy

Snapshots +

History x

Import (9/28/2022 12:29:55 PM)

Collections +

Filter Collections

2022

- Baby Shower Gavin
- Bland Fair 2022 Cu...
- ECHF
- Landon Farm Nov 5...
 - Annette Garvey 5
- Rockbridge 2022
- Texas Trip
- Halloween for c... 12
- UPHA
 - Bluegrass Hors...

Copy.. Paste

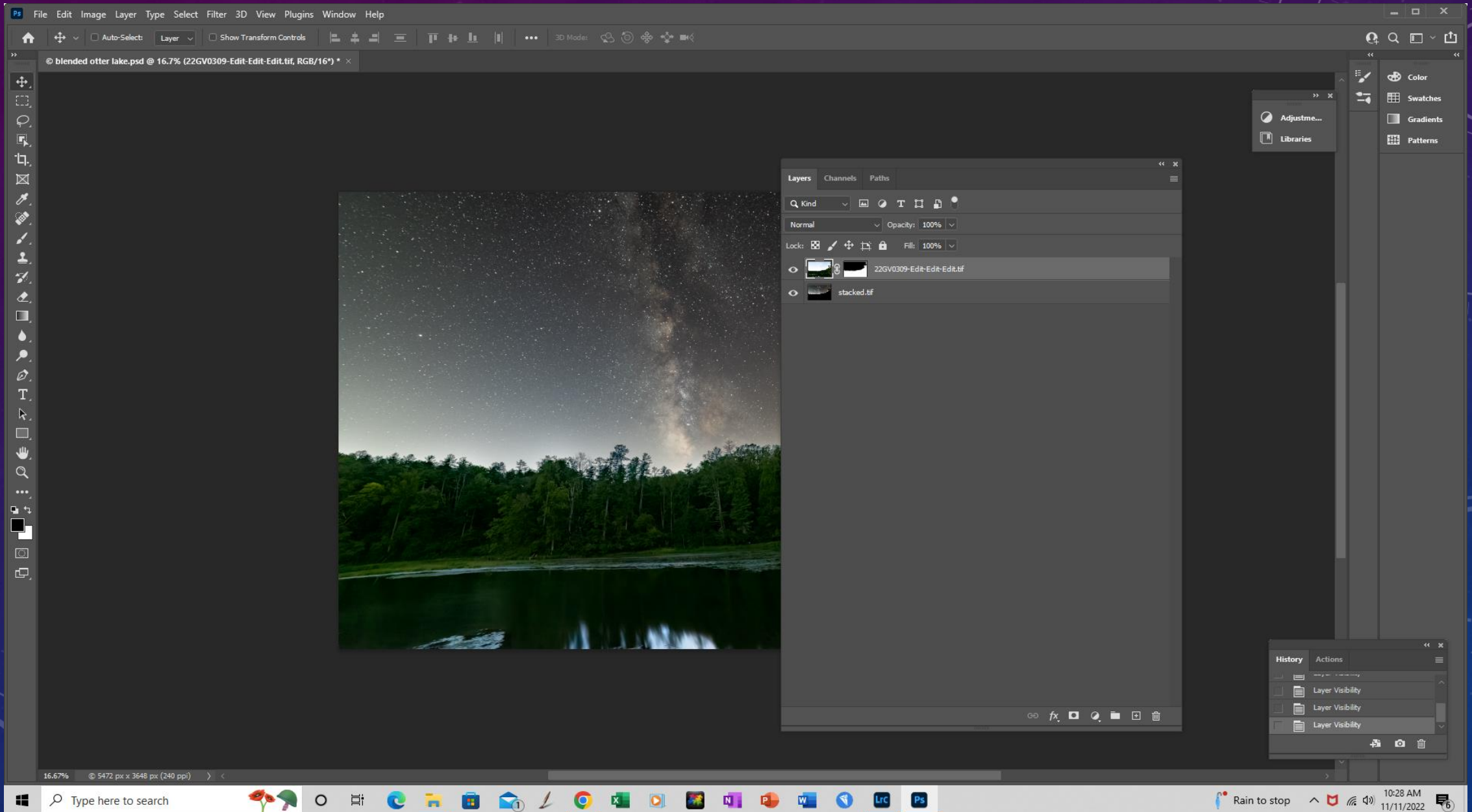
Soft Proofing

Folder: Otter lake 56 photos / 1 selected / 22GV0309-Edit-Edit-Edit - Copy.tif

Filter: Filters Off

Windows taskbar: Type here to search, 60°F Light rain, 9:51 AM 11/11/2022

I'll combine my stacked sky and light foreground in Photoshop and mask out the blurry, overexposed sky.



Finally, I'll take the image back into Lightroom for final tweaks. I have a hard time removing the fisheye look produced by the 14 mm lens and prefer, instead, to use 24mm. 24-35 work well, showing more of the Milky Way.

The screenshot displays the Adobe Lightroom Classic interface. The main window shows a photograph of a forest at night with the Milky Way galaxy visible in the sky. The interface includes several panels:

- Navigator:** Shows a thumbnail of the current photo and a list of recent actions, including "Export - Hard Drive" and "Green Saturation Shift".
- Basic Panel:** Contains sliders for Temperature (-2), Tint (0), Exposure (0.00), Contrast (0), Highlights (-9), Shadows (+16), Whites (0), Blacks (0), and Dehaze (+16).
- Histogram:** Shows the color distribution of the image, with ISO 2500, 14 mm, f/2.8, and 2970 sec.
- Grid Panel:** Shows a filmstrip of 56 photos, with the current photo selected as the 3rd of 4 in a group.

The Windows taskbar at the bottom shows the system tray with the date 11/11/2022 and time 9:51 AM, along with weather information (60°F Light rain).

Want more information?

Instagram has a group called **Milky Way Chasers**. Members post breathtaking photos with information about settings they used.

Kristine Rose Photography on Facebook offers free Milky Way training to get you started, and in-depth courses as well.

NightScapers on Facebook displays Milky Way photos.

PhotoPills and **PlanIt Pro** are popular apps for planning a Milky Way shoot even before you ever visit the locations you want to photograph.

LonelySpeck.com provides a Milky Way exposure calculator.



Kristine Rose
PHOTOGRAPHY



Instagram

- Home
- Search
- Explore
- Messages
- Notifications
- Create
- Profile



milkywaychasers

[Message](#)




5,267 posts 735K followers 215 following

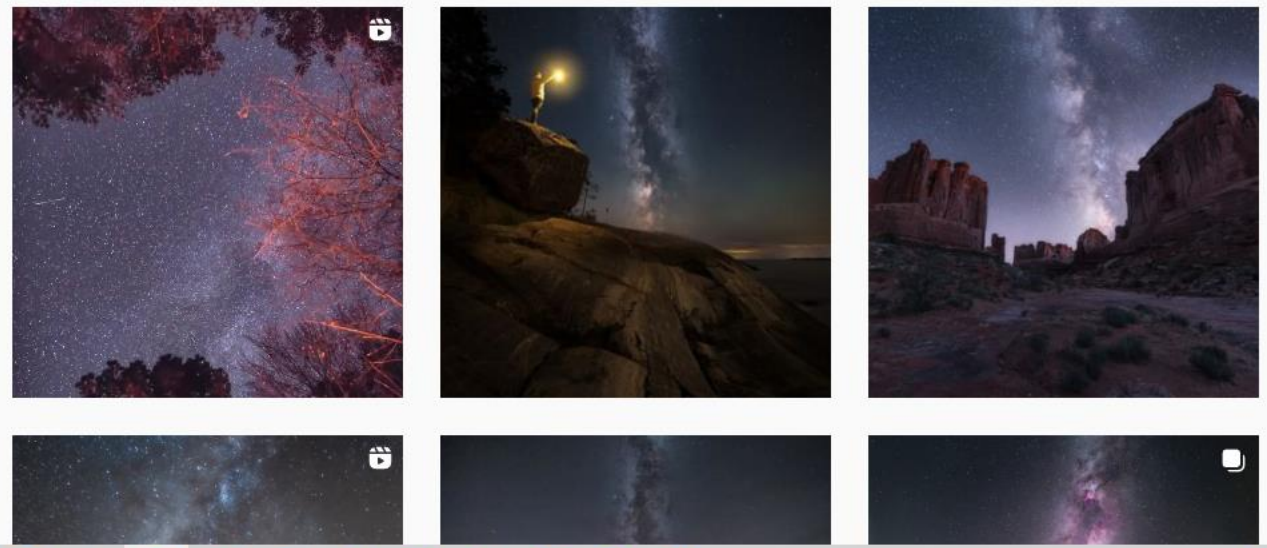
Milky Way Chasers
 TO BE FEATURED post on fb.com/groups/milkywaychasers
 @tracyleepphotos @astrolandscapes @burakesenbey
twitter.com/milkywaychasers ✓

Followed by kristinrosephotography, alaskanps, and ezekiel_coppersmith



Messages

POSTS REELS TAGGED



Instagram

Home

Search

Explore

Messages

Notifications

Create

Profile

More

